

RESPONSE TO OFFICE ACTION

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REMARKS

This response is intended as a complete response to the Office Action dated October 5, 2005. In view of the following discussion, the Applicants believe that all claims are in allowable form.

CLAIM OBJECTIONS

Claims 23-29 stand objected to as being improperly numbered. Specifically, there is no claim 22 in the claims as originally filed. The Examiner has indicated that she has re-numbered claims 23-29 as claims 22-28, respectively. Accordingly, the Applicants have renumbered the claims herein to reflect the change suggested by the Examiner. In addition, claims 23-24 and 26-27 have been amended to maintain their original dependency on the proper claims, as renumbered.

Thus, the Applicants respectfully submit that the objection should be withdrawn and the claims allowed.

CLAIM AMENDMENTS

Claim 16 has been amended to correct antecedent basis for the terms "sacrificial layer" and "capping layer."

Claim 28 has been amended to correct minor typographical errors in the claim. Specifically, the term "bi-layer mass" on line five has been corrected to read "bi-layer mask," and the term "bi-electric mask" on line eight has been corrected to read "bi-layer mask."

The Applicants submit that no new matter has been added by these amendments.

CLAIM REJECTIONS**§112 Claims 13, 15, 19, and 21**

Claims 13, 15, 19, and 21 stand rejected under 35 USC §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the Applicants regard as the invention. With respect to claim 13, the

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Applicants respectfully disagree. In response, the Applicants have amended claims 15, 19, and 21 to more clearly recite aspects of the invention.

Specifically, the phrase "the organic film" recited in line 2 of claim 13 has proper antecedent basis in claim 1. Claim 15 has been amended to replace the phrase "the organic layer" with the phrase "the organic film." Claim 19 has been amended to replace the phrase "the organic material" with the phrase "the organic film." Claim 21 has been amended to replace the phrase "the organic layer" with the phrase "the organic film." As such, the phrase "the organic layer" in each of these claims has antecedent basis in claim 1.

Thus, claims 13, 15, 19, and 21 conform to the requirements of 35 USC §112 and are patentable thereunder. Accordingly, the Applicants respectfully request that the rejection be withdrawn and the claims allowed.

§102 Claims 1, 6, 9-12, 17-18, and 22-28

Claims 1, 6, 9-12, 17-18, and 22-28 stand rejected under 35 USC §102(b) as being anticipated by United States Patent 5,935,762, issued August 10, 1999, to *Dai, et al.* (hereinafter *Dai*). The Applicants respectfully disagree.

With respect to 35 USC §102, or "anticipation," the Federal Circuit has repeatedly stated that "there is no anticipation unless all of the same elements are found in exactly the same situation and united in the same way . . . in a single prior art reference." *Perkin-Elmer Corp. v. Computervision Corp.*, 732 F.2d 888, 894 (Fed. Cir., 1984); *Kalman v. Kimberly-Clark Corp.*, 713 F.2d 760, 771, 218 U.S.P.Q. (BNA) 781, 789 (Fed. Cir. 1983). Here, *Dai* does not identify each of the claimed elements as arranged in independent claims 1 and 22 so as to establish a *prima facie* case of anticipation.

Dai discloses a two-layer top surface imaging process for dual damascene patterning. The Examiner quotes the Abstract of *Dai* substantially as a whole and asserts that it reads upon the limitations of the rejected claims without any further explanation. However, the Applicants can find no teaching or suggestion in *Dai* that meets the limitations recited in independent claims 1 and 22 and, therefore, respectfully disagree.

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The paragraph cited by the Examiner recites, in relevant part,

A substrate is provided with a tri-layer of insulation formed thereon. A first layer of silylation photoresist is formed on the substrate and is imaged with a hole pattern.... The hole pattern is then etched in the first photoresist. A second layer of photoresist is formed.... The line pattern in the second photoresist is etched. The hole pattern in the first photoresist is transferred into the top layer of composite insulation first and then into the middle etch-stop layer by successive etching. The line pattern in the second photoresist layer is transferred into the first photoresist layer through a subsequent resist dry etching process. Finally, the line pattern and the hole pattern are transferred simultaneously into the top and lower layers of the composite insulation layer, respectively, through a final dry oxide etching.

(*Dai*, Abstract.)

As such, *Dai* teaches a process wherein the first time any feature is etched into the film stack (the hole pattern) occurs after both the first photoresist and the second photoresist are formed and patterned. Therefore, *Dai* fails to teach or suggest patterning and etching a first feature (trench in claim 22) in the film stack and then forming a bi-layer mask comprising an organic film and an imaging film on the film stack; patterning the bi-layer mask; and etching a second feature (contact hole in claim 22) in the film stack using the patterned bi-layer mask as an etch mask, as recited in independent claims 1 and 22.

In addition, with respect to claim 22, *Dai* teaches a process wherein a hole is formed prior to a line. Moreover, in the method taught by *Dai*, the hole must be formed prior to the line due to the overlapping photoresist layers. As such, *Dai* further fails to teach, and teaches away from, patterning and etching a trench in the film stack; then forming a bi-layer mask comprising an organic film and an imaging film on the film stack; patterning the bi-layer mask; and then etching a contact hole in the film stack using the patterned bi-layer mask as an etch mask, as recited in independent claim 22.

Moreover, the Applicants disagree with the Examiner's contention that the process of *Dai* will inherently result in using a portion of the organic film in the trench (or contact hole in claim 27) as an etch mask so as to remove lithographic misalignment between the contact hole and the trench when the trench is etched, as recited in claims 13, 24, and 27.

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Thus, independent claims 1 and 22, and claims 6, 9-12, 17-18, and 23-28 respectively depending therefrom, are patentable over *Dai*. Accordingly, the Applicants respectfully request that the rejection be withdrawn and the claims allowed.

§103 Claims 2-5, 7-8, 13-15, and 19-21

Claims 2-5, 7-8, 13-15, and 19-21 stand rejected under 35 USC §103(a) as being obvious in light of *Dai* in view of United States Patent 6,809,028, issued October 26, 2004 to *Chen, et al.* (hereinafter *Chen*). The Applicants respectfully disagree.

Independent claim 1, from which the above-rejected claims depend, recites limitations not taught by any combination of the cited art. The teachings of *Dai* have been discussed above. *Chen* discloses a process for fabricating a dual damascene structure. The Examiner cites *Chen* to teach certain film stacks and materials. However, *Chen* fails to teach or suggest patterning and etching a first feature in the film stack; forming a bi-layer mask comprising an organic film and an imaging film on the film stack; patterning the bi-layer mask; and etching a second feature in the film stack using the patterned bi-layer mask as an etch mask, as recited in independent claim 1.

As such, the teachings of *Chen* may not be used to modify *Dai* in a manner that would yield the limitations recited in independent claim 1. As such, a *prima facie* case of obviousness has not been established because the combination of the cited references fails to yield all of the limitations recited in independent claim 1.

Moreover, with respect to claim 13, the Examiner states that *Chen* teaches using a portion of the organic film in the trench as an etch mask so as to remove lithographic misalignment between the contact hole and the trench when the contact hole is etched, as recited in claim 13. However, the Examiner points to no portion of *Chen* that provides such a teaching or suggestion. After careful review of the reference, the Applicants also find no such teaching. In fact, *Chen* fails to teach or suggest that any misalignment issues may even exist with respect to the contact hole and the trench. As such, *Chen* clearly fails to teach or suggest using a portion of the organic film in the trench as an etch mask so as to remove lithographic misalignment between the contact hole and the trench when the contact hole is etched, as recited in claim 13.

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With respect to claim 19, the Examiner states that *Chen* teaches wherein a portion of the organic material in the contact hole is used as an etch mask when the trench is formed in the film stack, as recited in claim 19. However, the Examiner points to no portion of *Chen* that provides such a teaching or suggestion. After careful review of the reference, the Applicants also find no such teaching. In fact, as discussed above, *Chen* fails to teach or suggest that any misalignment issues may even exist with respect to the contact hole and the trench. As such, *Chen* clearly fails to teach or suggest that a portion of the organic material in the contact hole is used as an etch mask when the trench is formed in the film stack, as recited in claim 19.

Thus, claims 2-5, 7-8, 13-15, and 19-21 are patentable over *Dai* in view of *Chen*. Accordingly, the Applicants respectfully request that the rejection be withdrawn and the claims allowed.

§103 Claim 16

Claim 16 stands rejected under 35 USC §103(a) as being obvious in light of *Dai* in view of United States Patent 6,576,545, issued June 10, 2003 to *Hopper, et al.* (hereinafter *Hopper*). The Applicants respectfully disagree.

Independent claim 1, from which the above-rejected claim depends, recites limitations not taught by any combination of the cited art. The teachings of *Dai* have been discussed above. *Hopper* discloses a process for fabricating a dual damascene structure. The Examiner cites *Hopper* to teach planarizing a metallized interconnect structure to remove a sacrificial layer and at least a portion of a capping layer. However, *Hopper* fails to teach or suggest patterning and etching a first feature in the film stack; forming a bi-layer mask comprising an organic film and an imaging film on the film stack; patterning the bi-layer mask; and etching a second feature in the film stack using the patterned bi-layer mask as an etch mask, as recited in independent claim 1.

As such, the teachings of *Hopper* may not be used to modify *Dai* in a manner that would yield the limitations recited in independent claim 1. As such, a *prima facie* case of obviousness has not been established because the combination of the cited references fails to yield all of the limitations recited in independent claim 1.

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Thus, claims 2-5, 7-8, 13-15, and 19-21 are patentable over *Dai* in view of *Hopper*. Accordingly, the Applicants respectfully request that the rejection be withdrawn and the claims allowed.

CONCLUSION

Thus, the Applicants submit that all claims now pending are in condition for allowance. Accordingly, both reconsideration of this application and its swift passage to issuance are earnestly solicited.

If, however, the Examiner believes that any unresolved issues still exist, it is requested that the Examiner telephone Mr. Alan Taboada at (732) 935-7100 so that appropriate arrangements can be made for resolving such issues as expeditiously as possible.

Respectfully submitted,

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